

PATENT COOPERATION TREATY

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

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PCT

WRITTEN OPINION
(PCT Rule 66)

Date of mailing
(day/month/year)

- 2 JUN 2005

Applicant's or agent's file reference
80580405

REPLY DUE

within **TWO MONTHS**
from the above date of mailing

International Application No.
PCT/AU2003/001336

International Filing Date (day/month/year)
10 October 2003

Priority Date (day/month/year)
10 October 2003

International Patent Classification (IPC) or both national classification and IPC
Int. Cl. ⁷ C08K 3/20, 3/22, 3/34, 3/36, 3/30, 3/14

Applicant

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION et al

Best Available Copy

1. This written opinion is the **first** drawn by this International Preliminary Examining Authority.
2. This opinion contains indications relating to the following items:
 - I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☒ Certain observations on the international application

3. The **FINAL DATE** by which the international preliminary examination report must be established according to Rule 69.2 is:
10 February 2006

4. The applicant is hereby invited to reply to this opinion.

When? See the Reply Due date indicated above. However, the Australian Patent Office will not establish the Report before the earlier of (i) a response being filed, or (ii) one month before the Final Date by which the international preliminary examination report must be established. The Report will take into account any response (including amendments) filed before the Report is established. If no response is filed by 1 month before the Final Date, the international preliminary examination report will be established on the basis of this opinion.

Applicants wishing to have the benefit of a further opinion (if needed) before the report is established should ensure that a response is filed at least 3 months before the Final Date by which the international preliminary examination report must be established.

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also For an additional opportunity to submit amendments, see Rule 66.4. For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4bis. For an informal communication with the examiner, see Rule 66.6.

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WRITTEN OPINION

International application No.

PCT/AU2003/001336

I. Basis of the opinion

1. With regard to the elements of the international application:*

- ☒ the international application as originally filed.
- ☐ the description, pages , as originally filed,
pages , filed with the demand,
pages , received on with the letter of
- ☐ the claims, pages , as originally filed,
pages , as amended under Article 19,
pages , filed with the demand,
pages , received on with the letter of
- ☐ the drawings, pages , as originally filed,
pages , filed with the demand,
pages , received on with the letter of
- ☐ the sequence listing part of the description:
pages , as originally filed
pages , filed with the demand
pages , received on with the letter of

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the written opinion was drawn on the basis of the sequence listing:

- ☐ contained in the international application in printed form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/fig.

5. ☐ This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed"

WRITTEN OPINION

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V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 12-49	YES
	Claims 1-11	NO
Inventive step (IS)	Claims	YES
	Claims 1-49	NO
Industrial applicability (IA)	Claims 1-49	YES
	Claims	NO

2. Citations and explanations

D1 WO 2001057142

D2 EP 1125969

D3 EP 292120

D4 EP 345644

D5 EP 486225

D6 EP 506033

New Citations

D7 US 6203906 (Christie et al) 20 March 2001

D8 US 6046267 (Vidaurre et al) 4 April 2000

NOVELTY (N) Claims 1-11

D1 discloses a coating material containing polyurethane and inorganic particles of silicon dioxide or various silicates having a size of 1-10 microns. The powdered particles are used at up to 5% by weight of the composition. D1 discloses the features of claims 1 and 10-11.

D2 discloses a thermoplastic polyester film that contains titanium dioxide up to 25%. The particles, typically 0.1-0.5 microns in size, are uniformly dispersed (see p4). D2 thus discloses the features of claims 1-9

D3 discloses a thermoplastic polyester resin formulation that contains titanium dioxide at 0.1-0.5 microns particle size in amounts above 20%. D3 discloses the features of claims 1-9

D4 discloses an abrasion resistant polyester film comprising 0.05-5% by weight of two types of aluminium oxide particles in size ranges between 0.00-3 microns (page 7 lines 14-57). The film also comprises particles made of a polymer that is heat resistant and thermosetting (see p5 lines 4-38). D4 discloses the features of claims 1-11.

D5 discloses a polyester film that comprises glass particles and fumed silica of particle size that includes submicron particles. D5 discloses the features of claim 1.

D6 discloses abrasion resistant polyester films comprising 0.01-5% silica particles of 0.01-0.1 microns. The silica particles are added in a slurry to the polymer mix before polymerization. D6 discloses the features of claims 1-9.

(cont.)

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PCT/AU2003/001336**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

There are typographical errors in the claims, for example in claims 46 and 48 the claim numbers run onto the next word.

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Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of V

D7 discloses a an abrasion resistant polymer comprising a thermosetting polyester containing 0.05-5% silicon carbide or alumina as micron sized particles (see abstract). The polymer can be shaped by moulding casting or extruding. D7 discloses the features of claims 1, and 10-11.

INVENTIVE STEP (IS) Claims 1-49

Claims 1-11 lack an inventive step for reasons given above. In addition, the use of different particle size ranges in the nanometre to micron range for filler or particle reinforced plastics is routine as can be seen from the range of size ranges used for filler containing polymer products in the prior art. The interparticle distance properties of claim 6 etc, are considered to be implicitly disclosed from the prior art documents that feature similar particle loadings.

D8 discloses a method of producing a broad range of void and gas occlusion free thermosetting polymeric materials that are reinforced with particulate filler. This process is done by mixing aggregate and polymer reactants under reduced pressure and is described as a variation of vacuum preparation techniques of the prior art. In order to avoid the problems of trapped gas in the polymer product, it would be obvious to use a reduced pressure process of this type with any of the filler/fine aggregate containing polymeric products of D1-D7. Claims 12-49 therefore also lack an inventive step.

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10 January 2006

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The Commissioner of Patents
IP Australia
PO Box 200
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Dear Madam

Commonwealth Scientific and Industrial Research Organisation
International patent application no PCT/AU2003/001336
Wear resistant polymers

We refer to the Written Opinion dated 2 June 2005, and enclose:

- Substitute claim pages 15-19

We make the following comments in respect to the reasoned statement (section V) in regard to novelty and inventive step:

Lack of novelty objection

We have amended claim 1 to relate to a "polymer article comprising a thermosetting polymer matrix", by including the subject matter of claim 10. As indicated in section V(2) of the written opinion, citations D2, D3, D5 and D6 do not disclose a "polymer article comprising a thermosetting polymer matrix". Accordingly, this amendment is novel over citations D2, D3, D5 and D6.

In addition, we have further amended claim 1 to include the limitation "wherein the polymer article is substantially free of gas bubbles". The basis for this amendment is provided on page 5, line 27. Accordingly, the present application is novel in light of the D1, D4 and D7.

US 2003/0139512 (equivalent to WO 0157142 (D1)) discloses a aqueous coating material which includes a thermosetting polymer matrix containing a powder having an average size of 1.0 to 10.0 microns. However, there is no disclosure that the product is substantially free of gas bubbles.

The objective of the coating is to provide a aqueous base coat material with reduced clouding (paragraph 0004), which results from poor dispersing and/or orientation of the colour pigments (paragraph 0003). D1 states that powders may be incorporated into the coating materials provided they are readily dispersed and do not agglomerate, however it is advantageous to incorporate the powders in the form of powder pastes (paragraph 0036). D1 states that the preparation of the coating material has no special features, with customary and known mixing equipment employed (paragraph 0134). Thus, the presence of gas bubbles would be an inherent feature of the coating.

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D1 is directed towards a coating with good optical properties, rather than good wear resistance. It is apparent that the incorporation of the powder into the polymer matrix has the aim to ensure good dispersion and avoid agglomeration to thus reduce clouding. Given the standard mixing techniques employed, there would be no expectation that a product substantially free of gas bubbles could be achieved. Indeed, as stated in the background to the invention of the present application, *"mixing particulate inorganic materials into a polymeric resin inevitably results in the inclusion of air bubbles which seriously affect the mechanical properties of any articles produced from the polymer composite mixture."* (page 2, lines 17-20)

Furthermore, D1 states that defoamers (paragraph 0123) may be included as a suitable additive, indicative that gas bubbles may represent problems. Accordingly, we submit that the present application is novel and inventive in light of D1.

US 5,006,589 (equivalent to EP 0345644 (D4)) discloses a thermosetting polymer matrix comprising a uniformly distributed (column 16, lines 55-56) ultrafine inorganic particulates of a size and %weight loading within the scope of claim 1. However, there is no disclosure that the product is substantially free of gas bubbles. The disclosures in D4 are suggestive that the addition of the particulate inorganic materials into the polymeric resin is nothing more than a blending or mixing operation (column 9, lines 49-60). Accordingly, D4 does not disclose or suggest the formation of a polymer article which is substantially free of gas bubbles.

US 6,203,906 (D7) discloses a thermosetting polymer matrix comprising a uniformly distributed ultrafine inorganic particulates of a size (greater than 3 μ m) and %weight loading within the scope of claim 1, although not claims 2-9. D7 discloses the incorporation of the inorganic particulates within the polymer resin via a mixing operation (column 4, line 33-37). While, *"a vacuum of 200 mbar was applied to remove any entrapped air"*, this operation alone would not have been sufficient to produce a polymer article which is substantially free of gas bubbles. Indeed, the use of a vacuum to remove trapped air is indicative of the problem of gas bubbles in the final product, rather than being indicative that the final product is substantially free of gas bubbles. Accordingly, D7 does not disclose the formation of a polymer article which is substantially free of gas bubbles.

Lack of inventive step objection

For the abovementioned reasons, we submit amended claims 1 to 11 are inventive over the prior art.

The basis for the remaining lack of inventive step objections (claims 12 – 49) is US 6,046,267 (D8) which relates to a method and apparatus for producing gas occlusion-free and void-free compounds and composites. The polymeric compounds produced by this process include polymeric composites, which include a combination of an inorganic binding system and thermosetting polymeric resins (column 8, lines 65-67). The inorganic binding system includes solid aggregate such as silica (Table 3). The particle size of the solid aggregate is on average about 0.2-0.3mm. The process includes 3 stages:

1. Washing the solid aggregate with a condensable gas, in the gas or liquid state, while degassing/de-airing the solidifiable liquid phase (eg. thermosetting resin).
2. Mixing the solid aggregate and solidifiable liquid phase, air-free, and in the presence of a condensable gas phase.

3. Condensing of the above gas phase within the mixed state compound.

The cited prior art differs from different embodiments of the present invention in at least the following areas:

- the cited prior art discloses the use of aggregates having a particle size of up to 595 microns, almost 60 times greater than the maximum size disclosed in claims 1 and 12 and about 750 times greater than the maximum size particles disclosed in claims 2 and 13;
- the mixing step includes milling the particulates with the polymer (claims 15, 26, 36, and 47);
- aggregate is not treated or coated with a dispersing agent (claim 18);
- the mixing step includes mixing the particles and solvent (liquid phase) together with the solidifiable liquid phase (amended claims 24, 31 and 45).

D8 does not relate to ultrafine inorganic particulates as there is almost 2 orders of magnitude difference (almost 3 orders of magnitude difference in relation to claim 2) in particle size between the cited reference and present invention.

As such, the person skilled in the art would have no expectation that the process could be applied to ultrafine inorganic particulates, given the complex surface chemistry which dictates the process. Accordingly, the person skilled in the art would have no motivation to use the process of D8 to avoid trapped air in the polymer products of D1 to D7.

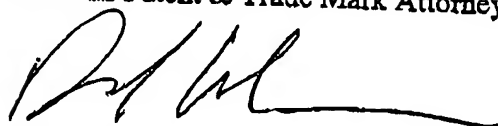
In addition, D8 does not disclose or suggest a process relating to the subject matter of claims 15, 18, 24, 26, 31, 36, 45 and 47.

To more clearly differentiate the present invention over D8, we have amended claims 24, 31 and 45 to clarify that the particulate material, polymer material and solvent are mixed to form a slurry. This provides a clear point of distinction over the process in D8 which states that the mixing step must be conducted with the presence of a condensable gas in the gaseous phase (column 13, lines 6-8). Thus, D8 teaches away from the methods defined in amended claims 24, 31 and 45.

Favourable reconsideration of this application is requested.

Yours faithfully

Freehills Patent & Trade Mark Attorneys



David Lambourne
Patent Attorney

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